2-3 Identifying Functions from Numerical Patterns

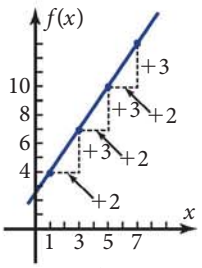
A 16-in. pizza has four times as much area as an 8-in. pizza. A grapefruit whose diameter is 10 cm has eight times the volume of a grapefruit with diameter 5 cm. In general, when you double the linear dimensions of a three-dimensional object, you multiply the surface area by 4 and the volume by 8. This is an example of the multiply–multiply property of power functions. It is similar to the add–add property of linear functions. Every time you add 1000 mi to the distance you have driven your car, you add a constant amount—say, $300—to the cost of operating that car.

In this section you will use such patterns to identify the type of function that fits a given set of function values. Then you will find more function values, either by following the pattern or by finding the equation of the function.

Objective

- Given a set of regularly spaced *x*-values and the corresponding *y*-values, identify which type of function they fit (linear, quadratic, power, or exponential).
- Find other function values without necessarily finding the particular equation.

The Add–Add Pattern of Linear Functions



Linear function

x	f(x)	
1	4	
3	7	+3
5	10	+3
7	13	+3
9	16	+3
+2	+2	+2

The add-add property

Figure 2-3a

Figure 2-3a shows the graph of the linear function $f(x) = 1.5x + 2.5$. As you can see from the graph and the adjacent table, each time you add 2 to x, y increases by 3. This pattern emerges because a linear function has constant slope. Verbally, you can express this property by saying that every time you add a constant to x, you add a constant (not necessarily the same as the constant added to x) to y. This property is called the **add–add property** of linear functions.